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Job No.: CQCE/BBMP/NMK/W.No.37/2020-21

TEST REPORT

Date: 21.09.2020

Client	:	**Executive Engineer,** RR Nagar Division, BBMP, Bangalore.
Agency	:	**Sri. N M Krishnamurthy,** Contractor, Bangalore.
Name of the work	:	Comprehensive development of Roads, drains and Footpath in Yeshwanthpura ward No.37 under PACKAGE-2019-20 RRN-DIV-(11), BBMP, Bangalore.
Source of location	:	Hot mix Plant, Bangalore
Date of testing	:	21.09.2020

The results of the tests conducted on the bitumen sample using for Bituminous Concrete

Sl. No	Description	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 °C, 1/10 mm	68	60 to 70
2	Softening point, °C	46	Min. 40
3	Ductility at 27°C, cm	100 >	Min. 75
4	Flash Point, °C	302	Min. 220

Note:

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Asst. Executive Engineer
Yeshwanthpura Sub-Division
Bruhat Bangalore Mahanagara Palike

For CIVIL QUALITY CONSULTANTS & ENGINEERS

Authorised Signatory

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No: CQCE/BBMP/NMK/W.No.37/2020-21

Aggregate Impact Value

IS: 2386 Part IV

Date: 21.09.2020

Client	Executive Engineer, RR Nagar Division, BBMP, Bangalore.
Agency	Sri. N M Krishnamurthy, Contractor, Bangalore.
Name of the Work	Comprehensive development of Roads, drains and Footpath in Yeshwanthpura ward No.37 under PACKAGE-2019-20 RRN-DIV-(11), BBMP, Bangalore.
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	21.09.2020

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	381	383	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	85	87	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	296	296	
4	Aggregate Impact value = percent fines $100^* (W_2/W_1)$ percent	22.31	22.72	22.51

Comments:-

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%

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Aggregate Impact Value

IS: 2386 Part IV

Date: 21.09.2020

Client	Executive Engineer, RR Nagar Division, BBMP, Bangalore.
Agency	Sri. N M Krishnamurthy, Contractor, Bangalore.
Name of the Work	Comprehensive development of Roads, drains and Footpath in Yeshwanthpura ward No.37 under PACKAGE-2019-20 RRN-DIV-(11), BBMP, Bangalore.
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	21.09.2020

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	379	381	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	83	85	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	296	296	
4	Aggregate Impact value = percent fines 100* (W_2/W_1) percent	21.90	22.31	22.10

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%

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Aggregate Impact Value

IS: 2386 Part IV

Date: 21.09.2020

Client	Executive Engineer, RR Nagar Division, BBMP, Bangalore.
Agency	Sri. N M Krishnamurthy, Contractor, Bangalore.
Name of the Work	Comprehensive development of Roads, drains and Footpath in Yeshwanthpura ward No.37 under PACKAGE-2019-20 RRN-DIV-(11), BBMP, Bangalore.
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	21.09.2020

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	382	384	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	85	87.5	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	297	296.5	
	Aggregate Impact value = percent fines			
	100* (W_2/W_1) percent	22.25	22.79	22.52

Comments:-

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%

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Aggregate Gradation Test
IS : 2386 Part I

21.09.2020

Client: Executive Engineer, RR Nagar Division, BBMP, Bangalore.
Agency: Sri. N M Krishnamurthy, Contractor, Bangalore.
Name of the Work: Comprehensive development of Roads, drains and Footpath in Yeshwanthpura ward No.37 under PACKAGE-2019-20 RRN-DIV-(11), BBMP, Bangalore.

Sample I / D: Hot Mix Plant, Bangalore
Type of Mix: Bituminous Concrete
Date of Testing: 21.09.2020

Total Weight of Sample: 5000 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	JOBMIX Gradation as per MORTH	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH
13.2	335	6.70	6.70	93.30	79 - 100	
9.5	562	11.24	17.94	82.06	70 - 88	
4.75	751	15.02	32.96	67.04	53 - 71	
2.36	625	12.50	45.46	54.54	42 - 58	
1.18	543	10.86	56.32	43.68	34 - 48	
0.600	630	12.60	68.92	31.08	26 - 38	
0.300	289	5.78	74.70	25.30	18 - 28	
0.150	440	8.80	83.50	16.50	12 - 20	
0.075	436	8.72	92.22	7.78	4 - 10	

Total Weight of Sample: 5000 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	JOBMIX Gradation as per MORTH	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH
13.2	370	7.40	7.40	92.60	79 - 100	
9.5	536	10.72	18.12	81.88	70 - 88	
4.75	740	14.80	32.92	67.08	53 - 71	
2.36	626	12.52	45.44	54.56	42 - 58	
1.18	621	12.42	57.86	42.14	34 - 48	
0.600	436	8.72	66.58	33.42	26 - 38	
0.300	356	7.12	73.70	26.30	18 - 28	
0.150	405	8.10	81.80	18.20	12 - 20	
0.075	530	10.60	92.40	7.60	4 - 10	

1203

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Job No.: CQCE/BBMP/NMK/W.No.37/2020-21

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

21.09.2020

Client	**Executive Engineer,** RR Nagar Division, BBMP, Bangalore.
Agency	**Sri. N M Krishnamurthy,** Contractor, Bangalore.
Name of Work	Comprehensive development of Roads, drains and Footpath in Yeshwanthpura ward No.37 under PACKAGE-2019-20 RRN-DIV-(11), BBMP, Bangalore.
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Bituminous Concrete
Date of Testing	21.09.2020

Result : Flakiness Index = **13.15%**

Elongation Index = **14.25%**

Result : Combined Flakiness & Elongation index **27.40%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%

Note:

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Lab No: CQCE/BBMP/NMK/W.No.37/2020-21

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

21.09.2020

Client	**Executive Engineer,** RR Nagar Division, BBMP, Bangalore.
Agency	**Sri. N M Krishnamurthy,** Contractor, Bangalore.
Name of Work	Comprehensive development of Roads, drains and Footpath in Yeshwanthpura ward No.37 under PACKAGE-2019-20 RRN-DIV-(11), BBMP, Bangalore.
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Bituminous Concrete
Date of Testing	21.09.2020

Result : Flakiness Index = **11.98%**

Elongation Index = **12.32%**

Result : Combined Flakiness & Elongation index **24.30%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%

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Lab No.: CQCE/BBMP/NMK/W.No.37/2020-21

21.09.2020

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Executive Engineer,** RR Nagar Division, BBMP, Bangalore.
Agency	**Sri. N M Krishnamurthy,** Contractor, Bangalore.
Name of Work	Comprehensive development of Roads, drains and Footpath in Yeshwanthpura ward No.37 under PACKAGE-2019-20 RRN-DIV-(11), BBMP, Bangalore.
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Bituminous Concrete
Date of Testing	21.09.2020

Result : Flakiness Index = **11.98%**

Elongation Index = **13.26%**

Result : Combined Flakiness & Elongation index **25.24%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%

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CQCE/BBMP/NMK/W.No.37/2020-21

Specific Gravity And Water Absorption Test
IS: 2386 Part III

23.09.2020

Client	Executive Engineer, RR Nagar Division, BBMP, Bangalore.
Agency	Sri. N M Krishnamurthy, Contractor, Bangalore.
Name of the Work	Comprehensive development of Roads, drains and Footpath in Yeshwanthpura ward No.37 under PACKAGE 2019-20 RRN-DIV-(11), BBMP, Bangalore.
Type of Mix	Bituminous Concrete
Date of Testing	21.09.2020 to 23.09.2020

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2022	2024	2026	
2	Weight of basket suspended in water	W_2 g	754	754	754	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1268	1270	1272	
4	Weight of saturated surface dry aggregate in air	W_3 g	2015	2017	2019	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	753	753	753	
6	Weight of oven dried aggregate	W_4 g	2009	2010	2011	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.689	2.691	2.692	2.691
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.711	2.716	2.721	2.716
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.30%	0.35%	0.40%	0.35%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%

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CQCE/BBMP/NMK/W.No.37/2020-21

23.09.2020

BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

CLIENT	Executive Engineer, RR Nagar Division, BBMP, Bangalore.
AGENCY	Sri. N M Krishnamurthy, Contractor, Bangalore.
NAME OF THE WORK	Comprehensive development of Roads, drains and Footpath in Yeshwanthpura ward No.37 under PACKAGE-2019-20 RRN-DIV-(11), BBMP, Bangalore.
DATE OF TESTING	23.09.2020

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	472	473
3. Weight of Asphalt and Mineral matter Extracted, g	28	27
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	28	27
7. Bitumen content in %	5.60	5.40
8. Average	5.50	

GRADATION AFTER EXTRACTION

TABLE - 1

SIEVE SIZE	Percent Passing, %		JOBMIX
mm	Sample 1	Sample 2	Gradation
19	100.00	100.00	100
13.2	91.25	92.85	79-100
9.5	80.36	82.68	70-88
4.75	65.56	66.38	53-71
2.36	52.15	53.18	42-58
1.18	42.63	43.65	34-48
0.6	33.28	31.51	26-38
0.3	25.56	26.68	18-28
0.15	14.45	16.35	12-20
0.075	5.89	6.36	4-10

Note:

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CQCE/BBMP/NMK/W.No.37/2020-21

25.09.2020

BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

CLIENT	Executive Engineer, RR Nagar Division, BBMP, Bangalore.
AGENCY	Sri. N M Krishnamurthy, Contractor, Bangalore.
NAME OF THE WORK	Comprehensive development of Roads, drains and Footpath in Yeshwanthpura ward No.37 under PACKAGE-2019-20 RRN DIV (11), BBMP, Bangalore.
DATE OF TESTING	25.09.2020

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1 Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	472	473.5
3. Weight of Asphalt and Mineral matter Extracted, g	28	26.5
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	28	26.5
7. Bitumen content in %	5.60	5.30
8. Average	5.45	

GRADATION AFTER EXTRACTION

TABLE - 1

SIEVE SIZE mm	Percent Passing, % Sample 1	Sample 2	JOBMIX Gradation
19	100.00	100.00	100
13.2	90.15	92.58	79-100
9.5	84.65	85.25	70-88
4.75	63.69	64.18	53-71
2.36	51.56	53.26	42-58
1.18	45.24	46.32	34-48
0.6	33.63	34.15	26-38
0.3	21.58	22.63	18-28
0.15	15.49	16.35	12-20
0.075	5.48	6.31	4-10

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Lab No: CQCE/BBMP/NMK/W.No.37/2020-21

Date: 23.09.2020

TEST REPORT ON STABILITY OF MIX

Client	:	**Executive Engineer,** RR Nagar Division, BBMP, Bangalore.
Agency	:	**Sri. N M Krishnamurthy,** Contractor, Bangalore.
Name of the Work	:	Comprehensive development of Roads, drains and Footpath in Yeshwanthpura ward No.37 under PACKAGE-2019-20 RRN-DIV-(11), BBMP, Bangalore.
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	23.09.2020

The results of the tests conducted on the bituminous concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	10.25	9.89	9 Kn (min)
2	Marshal flow, mm	3.65	2.78	2 – 4
3	Percent air voids in Mineral Aggregate	13.36	14.52	13 – 15
4	Voids in Compacted Mix	3.50	4.58	3 – 6
5	Percent Voids filled with Bitumen	70.36	71.84	65 - 75
6	Density, g/cc	2.27	2.26	--

Note:

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Yeshwanthpura Sub-Division
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Job No: CQCE/BBMP/NMK/W.No.37/2020-21

Date: 24.09.2020

TEST REPORT ON STABILITY OF MIX

Client	:	Executive Engineer, RR Nagar Division, BBMP, Bangalore.
Agency	:	Sri. N M Krishnamurthy, Contractor, Bangalore.
Name of the Work	:	Comprehensive development of Roads, drains and Footpath in Yeshwanthpura ward No.37 under PACKAGE-2019-20 RRN-DIV-(11), BBMP, Bangalore.
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	24.09.2020

The results of the tests conducted on the bituminous concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	10.10	9.75	9 Kn (min)
2	Marshal flow, mm	3.68	3.25	2 – 4
3	Percent air voids in Mineral Aggregate	13.42	13.89	13 – 15
4	Voids in Compacted Mix	3.74	4.25	3 – 6
5	Percent Voids filled with Bitumen	70.21	69.6	65 - 75
6	Density, g/cc	2.25	2.26	--

Note:

⇒ This test report shall not be reproduced except in full, without written approval of the laboratory.

⇒ The results indicated above are based on the tests carried out on the samples received in the laboratory.

⇒ Any Query regarding the report must be reported within 30 days from the date of testing.

Asst. Executive Engineer
Yeshwanthpura Sub-Division
Bruhat Bangalore Mahanagara Palike

For CIVIL QUALITY CONSULTANTS & ENGINEERS

Authorised Signatory

Office & Laboratory : # 133, Bhuvaneshwarinagar, Dodda Basti Main Road, Bangalore - 560 056.
e-mail: civilqualityconsultants@gmail.com Ph: 080-23240644 / Mob: 8553518550

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CIVIL QUALITY CONSULTANTS & ENGINEERS

(Buildings Geo-Tech & Highway Materials Testing Laboratory)
An ISO 9001: 2015 Certified Company
NABL Accredited As Per ISO/IEC : 17025:2005 Laboratory

JAS-ANZ
ISO 9001:2000 CERTIFIED

Job No: CQCE/BBMP/NMK/W.No.37/2020-21

Date: 25.09.2020

TEST REPORT ON STABILITY OF MIX

Client	:	**Executive Engineer,** RR Nagar Division, BBMP, Bangalore.
Agency	:	**Sri. N M Krishnamurthy,** Contractor, Bangalore.
Name of the Work	:	Comprehensive development of Roads, drains and Footpath in Yeshwanthpura ward No.37 under PACKAGE-2019-20 RRN-DIV-(11), BBMP, Bangalore.
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	25.09.2020

The results of the tests conducted on the bituminous concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	10.15	9.65	9 Kn (min)
2	Marshal flow, mm	3.36	2.99	2 – 4
3	Percent air voids in Mineral Aggregate	13.48	14.35	13 – 15
4	Voids in Compacted Mix	3.65	4.54	3 – 6
5	Percent Voids filled with Bitumen	70.15	71.25	65 - 75
6	Density, g/cc	2.26	2.27	--

Note:

⇒ This test report shall not be reproduced except in full, without written approval of the laboratory.

⇒ The results indicated above are based on the tests carried out on the samples received in the laboratory.

⇒ Any Query regarding the report must be reported within 30 days from the date of testing.

Asst. Executive Engineer
Yeshwanthpura Sub-Division
Bruhat Bangalore Mahanagara Palike

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